

WHAT IS CLAIMED IS:

1. A method for preparing a coated superalloy article, comprising the steps of

furnishing a nickel-base superalloy article substrate having a rhenium content of not less than about 4.0 percent by weight; thereafter

depositing an aluminum-containing coating onto a surface of the article substrate, the aluminum-containing coating including

an additive zone having an average aluminum content of not greater than about 27 percent by weight, and

a diffusion zone of interdiffusion with the article substrate, wherein a ratio of a thickness of the additive zone to a thickness of the diffusion zone is not greater than about 3:1.

2. The method of claim 1, wherein the step of furnishing includes the steps of

furnishing the nickel-base superalloy article made of the alloy René N6, which has a nominal composition in weight percent of about 12.5 percent cobalt, about 4.2 percent chromium, about 1.4 percent molybdenum, about 5.75 percent tungsten, about 5.4 percent rhenium, about 7.2 percent tantalum, about 5.75 percent aluminum, about 0.15 percent hafnium, about 0.05 percent carbon, about 0.004 percent boron, about 0.01 percent yttrium, balance nickel and incidental impurities.

3. The method of claim 1, wherein the step of furnishing includes the step of

stress relieving the article substrate, and the step of depositing is performed without any intermediate cold working of the surface of the article substrate.

4. The method of claim 1, wherein the step of furnishing includes the step of

furnishing the nickel-base superalloy article substrate in the form of a component of a gas turbine engine.

5. The method of claim 1, wherein the step of furnishing includes the step of

furnishing the nickel-base superalloy article substrate in the form of a gas turbine blade.

6. The method of claim 1, wherein the ratio of the thickness of the additive zone to the thickness of the diffusion zone is from about 0.75:1 to about 1.25:1.

7. The method of claim 1, wherein the step of depositing includes the step of depositing the aluminum-containing coating by a technique selected from the group consisting of vapor-phase aluminiding and chemical vapor deposition.

8. The method of claim 1, wherein the step of depositing includes the step of heating the article substrate to a temperature of from about 1925°F to about 2000°F.

9. The method of claim 1, wherein the average aluminum content of the additive zone is from about 22 to about 27 percent by weight.

10. A method for preparing a coated superalloy article, comprising the steps of furnishing a nickel-base superalloy article substrate having a rhenium content of not less than about 4.0 percent by weight; thereafter depositing an aluminum-containing coating onto a surface of the article substrate at a temperature of from about 1925°F to about 2000°F, the aluminum-containing coating including

an additive zone having an average aluminum content of not greater than about 27 percent by weight, and  
a diffusion zone of interdiffusion with the article substrate.

11. The method of claim 10, wherein the step of furnishing includes the steps of

furnishing the nickel-base superalloy article made of the alloy René N6, which has a nominal composition in weight percent of about 12.5 percent cobalt, about 4.2 percent chromium, about 1.4 percent molybdenum, about 5.75 percent tungsten, about

5.4 percent rhenium, about 7.2 percent tantalum, about 5.75 percent aluminum, about 0.15 percent hafnium, about 0.05 percent carbon, about 0.004 percent boron, about 0.01 percent yttrium, balance nickel and incidental impurities.

12. The method of claim 10, wherein the step of furnishing includes the step of stress relieving the article substrate, and the step of depositing is performed without any intermediate cold working of the surface of the article substrate.

13. The method of claim 10, wherein the step of furnishing includes the step of furnishing the nickel-base superalloy article substrate in the form of a component of a gas turbine engine.

14. The method of claim 10, wherein the step of furnishing includes the step of furnishing the nickel-base superalloy article substrate in the form of a gas turbine blade.

15. The method of claim 10, wherein the step of depositing includes the step of depositing the aluminum-containing coating by a technique selected from the group consisting of vapor-phase aluminiding and chemical vapor deposition.

16. The method of claim 10, wherein the average aluminum content of the additive zone is from about 22 to about 27 percent by weight.

17. A coated superalloy article comprising  
a nickel-base superalloy article substrate having a rhenium content of not less than about 4.0 percent by weight; and  
an aluminum-containing coating at a surface of the article substrate, the aluminum-containing coating including  
an additive zone having an average aluminum content of not greater than about 27 percent by weight, and  
a diffusion zone of interdiffusion with the article substrate,

wherein a ratio of a thickness of the additive zone to a thickness of the diffusion zone is not greater than about 3:1.

18. The article of claim 17, wherein the nickel-base superalloy article is made of the alloy René N6, which has a nominal composition in weight percent of about 12.5 percent cobalt, about 4.2 percent chromium, about 1.4 percent molybdenum, about 5.75 percent tungsten, about 5.4 percent rhenium, about 7.2 percent tantalum, about 5.75 percent aluminum, about 0.15 percent hafnium, about 0.05 percent carbon, about 0.004 percent boron, about 0.01 percent yttrium, balance nickel and incidental impurities.

19. The article of claim 17, wherein the article substrate is a component of a gas turbine engine.

20. The article of claim 17, wherein the article substrate is a gas turbine blade.